

From: Philip B. Stark [REDACTED]  
 Subject: Re: Official statements (subject change)  
 Date: December 25, 2019 at 6:10 PM  
 To: David Dill [REDACTED]  
 Cc: Philip B. Stark stark@stat.berkeley.edu, Barbara Simons [REDACTED], Marilyn Marks [REDACTED],  
 Richard DeMillo rich@demillo.com, GARLAND FAVORITO [REDACTED], David Jefferson [REDACTED],  
 David L. Dill [REDACTED], Donna Curling dcurling0531@gmail.com, Donna Price donnaprice@gaverifiedvoting.org,  
 Ronald L. Rivest [REDACTED]

Hi Dave--

Separately, I sent Ron, Barbara, and David J. examples to show that there is nothing revisionist about this; please see below.

The RLA does not ensure that the paper trail is trustworthy. It *requires* that the paper trail is trustworthy. Other audits, inspections, activities, etc., are required to establish whether the paper is trustworthy. But unless that has been established, it is not possible to limit the risk that an audit will fail to correct a wrong outcome; therefore, there can be no true RLA. It's only a procedure that says nothing about the correctness of the outcome.

Happy holidays,  
 Philip

[Unless you dodge the issue by simply defining whatever a full hand count would show to be "correct," even if the paper trail has been compromised, the trustworthiness of the paper matters. It might be legally OK to define "correct" as whatever a full hand count would show (and it's mathematically clear), but morally it is not OK: we need to be concerned about whether the record really shows what eligible voters expressed to the system.]

Stark, CAST, 2009:

"Wrong" means that the apparent outcome disagrees with the outcome a full hand count of the audit trail would show. Ensuring the integrity of the audit trail is vital: A full hand count need not show the true outcome if the audit trail is incomplete or inaccurate, ...

Stark, Risk-limiting post-election audits: P-values from common probability inequalities, 2009:

Postelection audits of a random sample of batches of ballots against a **trustworthy** audit trail can limit the risk of certifying an incorrect electoral outcome to  $\alpha$ , guaranteeing that—if the apparent outcome is wrong—the chance of a full hand count of the audit trail is at least  $1-\alpha$ .

Miratrix and Stark, Election Audits using a Trinomial Bound, 2009:

It is crucial to ensure that the audit trail is **accurate**, durable, and complete from its creation through the audit. If there is no audit trail, there can be no audit. If there is an audit trail, but no audit, there is no assurance of accuracy. ***If there is an audit trail and an audit, but the audit trail does not reflect the electoral outcome, there is still no assurance.***

...

Henceforth, we assume that the audit trail is complete and accurate.

Benaloh et al., 2011:

Compliance audits can be used to assess whether the last property listed above holds: Given that the election used a strongly software-independent voting system, did it adhere to procedures that should keep the audit trail sufficiently accurate to reconstruct the outcome according to how voters cast their ballots? ***Strong evidence that such procedures were followed is strong evidence that the legally correct outcome—what a full hand count of the audit trail would show—is the same as the outcome according to how the voters originally cast their ballots.*** As we discuss below in section 4, we believe that compliance audits should always be required: If the election fails the compliance audit,<sup>3</sup> there is no assurance that even a full hand count of the audit trail would show the outcome according to how the voters really voted. Below, we assume that the election has passed a compliance audit.

...

In essence, our method adds a special risk-limiting audit to a strongly software-independent voting system (one that has had a compliance audit to ensure that its audit trail is intact).

Lindeman & Stark, A Gentle Introduction to Risk-Limiting Audits, 2012

Because a risk-limiting audit relies upon the audit trail, preserving the audit trail complete and intact is crucial. If a jurisdiction's procedures for protecting the audit trail are adequate in principle, ensuring compliance with those procedures (possibly as part of a comprehensive canvass or a separate compliance audit) can provide strong evidence that the audit trail is trustworthy. ***If the compliance audit does not generate convincing affirmative evidence that the ballots have not been altered and that no ballots have been added or lost, a risk-limiting audit may be mere theater*** [Benaloh et al., 2011, Stark and Wagner, 2012].

Stark & Wagner, Evidence-based Elections, 2012

We sketch how evidence-based elections might be conducted, using several technical tools. The basic approach we advocate is simple: evidence = auditability + auditing. In other words, the voting equipment must be auditable: ***It must produce a trustworthy audit trail that can be used to check the accuracy of the election.*** In addition, election processes must incorporate auditing as part of the routine electoral process, to produce and check evidence that the election found the right winners.

...

Ultimately, the purpose of a compliance audit is to generate convincing affirmative evidence that a full hand count of the audit trail would correctly reflect the outcome of the election, as the votes were cast. If the election passes the compliance audit, we may proceed to the risk-limiting audit. **However, if the compliance audit cannot confirm that the audit trail is trustworthy, then the overall canvass process must be deemed a failure: It did not produce convincing evidence that the election was decided correctly.**

On Wed, Dec 25, 2019 at 2:58 PM David Dill <[REDACTED]> wrote:

Philip,

I really think your recent definition of RLAs is revisionist. This is just a terminological point that doesn't change the need for trustworthy paper ballots, but precise terminology is important and changing definitions that were carefully written and are now commonly accepted is very confusing.

In the past, I asked you personally for clarification of the definition of RLAs, and the essence of the definition is that an RLA is an audit that bounds the probability that a full manual tally will change the outcome of the election. That's a great definition, and, like most definitions, it has sharp boundaries. Obviously, if you have unreliable paper ballots, a full manual tally has the same "garbage-in, garbage-out" property that the random tabulation audit would have.

A "full audit" of an election would include audits of lots of other things, some of which we do better than others. To trust the outcome, we'd like to check that the ballot marking accurately represented voter intent, that the physical chain of custody of ballots was preserved, that the votes cast equals the voters signed into the poll book, that people who tried to vote were able to do so if and only if they were eligible (including meeting registration requirements). Etc.

RLAs are understood to be tabulation audits. Tabulation audits are very important, perhaps the most important audits to do at this time. But they're not everything that needs to be done to ensure that the outcome of an election represents voter intent.

Dave

On Wed, Dec 25, 2019 at 10:52 AM Philip B. Stark <[stark@stat.berkeley.edu](mailto:stark@stat.berkeley.edu)> wrote:

With regard to this statement:

The ASA statement says "To be risk-limiting, the overall procedure must ensure that if the machine-count electoral outcome is incorrect, there is a large, pre-specified chance that the audit will reveal the correct outcome." Even though the new crop of BMDs had not hit the market in 2010 (so the issue of voter verification of paper ballots didn't exist), the phrase "chain of custody" does not appear in the statement. In other words, the ASA appears to view an RLA strictly as an algorithm, which is how we all viewed it at the time.

That is *not* viewing an RLA as an algorithm. It is explicitly a *functional* definition: a RLA has to ensure that the overall procedure has a large, pre-specified chance of finding the correct outcome. If the paper trail is not trustworthy, no procedure can have a large, pre-specified chance of correcting the outcome if the outcome is wrong. *Trustworthy* paper is required. That requires secure chain of custody. And it requires a trustworthy way of marking the paper.

I am not advocating changing the definition of RLA in any way, and certainly not putting HMPB into the definition.

RLAs simply require trustworthy paper: no procedure can limit the risk of certifying wrong outcomes if the paper trail is not trustworthy. All that's changed since the original definition of RLAs is the explicit recognition that BMD output is not trustworthy. That doesn't change the definition of RLAs. It just shows they are not possible using BMDs, just like they are not possible without paper, and not possible if the paper trail has not been secured/curated well.

Happy holidays,  
Philip

On Tue, Dec 24, 2019 at 7:26 PM Barbara Simons <[REDACTED]> wrote:

Hello, Marilyn.

This is my second response. I know that you have raised other issues, and I'll attempt to get to them, as I find the time. I'm sure you appreciate that I have other things happening in my life now.

Before getting into the substance of my response, I'd like to address your point 2) below that quotes an Aug, 2018 VV document. I agree that the quote is not what we would say today. As I discuss below, there is a history behind the understanding of an RLA. The quote you included is one of several that I expect we all - and I'm including some people who have never been or no longer are associated with VV - would like to update, given current knowledge. I give a couple of examples below.

I must emphasize yet again that our most recent statements/letters dominate older ones. Perhaps it might be worthwhile for



I must emphasize yet again that our most recent statements/letters dominate older ones. Perhaps it might be worthwhile for staff to edit the 2018 document to make it consistent with our current position, though I would not make it a high priority item. Staff have lost a lot of time dealing with all that has happened in the past month, to say nothing of the tremendous stress we all have felt with VV being trashed in a national publication and elsewhere.

You asked if VV's position has changed in the past 45 days. Whether or not it's changed may be in the eyes of the beholder. I believe that we have clarified some areas in ways that I would have expected to please you. For example, near the top of VV's website, you'll find the headline "Verified Voting Statement on Ballot Marking Devices and Risk-limiting Audits – December 17, 2019", together with the first portion of the statement and the link to the full statement: <https://www.verifiedvoting.org/bmd-rla-statement-dec2019/>.

Because the VV statement is very short, I've included the full text below. It represents VV's official position, independent of any previous quotes or documents. Note that it says that 1) BMD ballots may not accurately capture the voter's intent, 2) VV opposes the purchase and deployment of BMDs for all, 3) VV states that if the voter finds a discrepancy with her ballot, it's essentially impossible to determine the cause of that discrepancy, including whether or not there's a problem with the BMD, 4) for these and other reasons VV recommends that the use of BMDs be minimized. It also says that an RLA is a tabulation audit only and does not check that the BMDs accurately captured the voters' choices, etc.

Furthermore, the VV statement explicitly states that any assistance VV provides with RLA pilots does NOT imply any kind of endorsement of the equipment, etc. We made a similar statement in the GA letter.

I realize that BMDs have changed our common understanding of a "voter marked paper ballot". Consequently, Philip and some other folks want to limit the definition of an RLA to apply only to HMPBs + a strong chain of command. I think people can differ in their perspective (tabulation audit vs audit of only HMPBs + strong chain of custody) without acrimony - at least I hope so.

And now to a relevant historical example. In 2010 the American Statistical Association issued a statement in support of risk-limiting post-election audits. The general endorsement is still on the ASA website at <https://www.amstat.org/asa/News/ASA-Endorses-Post-Election-Audits-Principles.aspx>. The precise statement is at [https://www.amstat.org/asa/files/pdfs/POL-Risk-Limiting\\_Endorsement.pdf](https://www.amstat.org/asa/files/pdfs/POL-Risk-Limiting_Endorsement.pdf). My recollection (Philip, please correct me if I'm wrong) is that Philip played a key role in getting that ASA endorsement which, I note, has neither been updated nor removed from the webpage.

The ASA statement says "To be risk-limiting, the overall procedure must ensure that if the machine-count electoral outcome is incorrect, there is a large, pre-specified chance that the audit will reveal the correct outcome." Even though the new crop of BMDs had not hit the market in 2010 (so the issue of voter verification of paper ballots didn't exist), the phrase "chain of custody" does not appear in the statement. In other words, the ASA appears to view an RLA strictly as an algorithm, which is how we all viewed it at the time.

Deploying an RLA instead of a fixed percentage count was a huge advance. We all were very appreciative of the major contribution that Philip made, and I recall being delighted that the ASA had issued its statement of support.

There also is more recent history. I haven't looked at the RLA legislation in Colorado and Rhode Island, but I just read the relevant portions of HR1 and I expect the state legislation is similar. I've included the HR1 definitions below, after the VV statement. They are consistent with the former definition of an RLA as an algorithm applied to a set of scanned ballots that checks the outcome.

The HR1 text is similar to that of the ASA, saying: "if the reported outcome of the election is incorrect, there is at least a predetermined percentage chance that the audit will replace the incorrect outcome with the correct outcome ..."

By contrast with HR1, VV's statement makes clear that an RLA applied to a BMD election cannot determine the correct outcome of that election.

VV's earlier statements, such as the one you referenced, represented the understanding at the time, as did statements that many RLA supporters have made over the years. Our collective understanding has changed rather recently. I don't understand why you are singling us out for saying what everyone else was saying concurrently.

For what it's worth, my personal view, which I realize differs from Philip's, is that an RLA is an algorithm, and like any algorithm the quality of the output depends on the quality of the input. If voters don't verify their ballots, then while an RLA can determine the correctness of the tabulation of those ballots, it cannot determine the correctness of the election outcome.

One possible approach, that I think was suggested initially by Harvey B, may be to refer instead to a tRLA, with the t (or T) standing for tabulation. I could live with that, though it's not currently VV policy and I'm not convinced it's needed, so long as our current position is clear, which I believe it is.

And, then there's the messy business of legislative wording that reflects people's previous understanding. If we have a future in which it's possible to pass legislation along the lines of HR1, we all will want to work on updating the wording. (I wouldn't

be surprised if some on this email contributed to the original wording). Unfortunately, that's not a high priority for now, given that HR1 is not about to become law.

Regards,  
Barbara

----Here is the VV statement on BMDs and RLAs----

This statement is intended to clarify Verified Voting's position regarding the use of ballot-marking devices (BMDs) in elections, and the use of risk-limiting audits (RLAs). It is approved by the President, Board of Directors, and Staff of Verified Voting.

#### Ballot-marking devices

Verified Voting believes that voters should vote on paper ballots, but we recognize an important distinction between hand-marked and machine-marked ballots. Hand-marked paper ballots are not subject to inaccuracies or manipulation from software bugs or malicious code. In contrast, machine-marked paper ballots produced using BMDs might not accurately capture voter intent if the software or ballot configuration is buggy or malicious.

Verified Voting specifically opposes the purchase and deployment of new voting systems in which all in-person voters in a polling place are expected to use BMDs. The trustworthiness of an election conducted using BMDs depends critically on how many voters actually verify their ballots, and how carefully they do it. All voters who vote on BMDs should be made aware of the importance of carefully and conscientiously verifying their ballots before casting them, and should be actively encouraged to do so. However, empirical research thus far shows that few voters using BMDs carefully verify their printed ballots. Moreover, if voters do verify BMD-marked ballots and find what they believe are discrepancies, there is no reliable way to resolve whether the voters made mistakes or the BMDs did. For these and other reasons (such as cost) Verified Voting recommends that the use of BMDs be minimized.

#### Risk-limiting audits

A risk-limiting audit (RLA) is a tabulation audit. It uses statistical methods to provide confidence that the paper ballots are correctly tabulated. It checks only the tabulation. It does not check — among other things — that the BMDs correctly captured the voters' choices, nor that voters actually verified their ballots, nor that the ballots tabulated are exactly those that should be, with none added, modified or lost.

Verified Voting recommends that any electronic tabulation of paper ballots be checked by a risk-limiting audit. We assist jurisdictions in piloting or running such tabulation audits. However, Verified Voting's assistance with RLA pilots or RLAs does not imply that Verified Voting endorses that jurisdiction's equipment, procedures, or election outcomes.

#### Best practices

Verified Voting strongly advocates for best practices, including hand-marked paper ballots (with some judicious use of BMDs), careful voter verification of machine-marked ballots, strong chain of custody for all paper ballots, proper ballot accounting, and risk-limiting audits to verify tabulations of paper ballots.

----Here is the relevant text from HR1----

Sec 1502. (2)(A)(i) PAPER BALLOT REQUIREMENT... For purposes of this subclause, the term 'individual, durable, voter-verified paper ballot' means a paper ballot marked by the voter by hand or a paper ballot marked through the use of a nontabulating ballot marking device or system, so long as the voter shall have the option to mark his or her ballot by hand.

Sec. 3011. Sec. 299(b)(2) Risk-Limiting Audits Described ... under which, if the reported outcome of the election is incorrect, there is at least a predetermined percentage chance that the audit will replace the incorrect outcome with the correct outcome as determined by a full, hand-to-eye tabulation of all votes validly cast in that election that ascertains voter intent manually and directly from voter-verifiable paper records.

On 12/24/19 2:17 PM, Marilyn Marks wrote:

Barbara,

Thanks for your note.

I'm sorry that you feel that critics of VV's actions of the last 2 years in GA are "assigning blame." That is not the point. The point is to understand VV's actions and position, and hopefully to seek solid clarification from VV on what its position is in hopes that the position is consistent with those of us who have been fighting BMDs and so-called "RLAs" of their results.



It is an important issue, not just for GA, but for NC, FL, PA and other states. I'm very nervous about VV beginning to interact in NC, for example. VV wrote an excellent letter to the NCSBE, but I'm frightened that we'll see VV in the mix of people like David Becker who are trying to tell NCSBE Chair that BMDs can be audited and they will help with the RLAs.

If VV's position has changed in the last 45 days, we would certainly like to know. If it hasn't changed, that would be helpful to know too.

Maybe it is simpler just to focus on the still open and confusing issues in GA. If you could respond to these questions, I'm sure it would clear up a lot:

1. Does VV stand by Lindeman's comments to the press about what the Cartersville audit accomplished? (in the article linked here. <https://www.ajc.com/news/state--regional-govt--politics/paper-ballots-recounted-check-election-results-georgia/sjlqz7asq8SLkTgGZszRI/> )
2. Does VV still describe a tabulation audit as follows?

"Tabulation audits are intended to provide a quality control check that the reported results of an election match the intent of the voters. There are other valuable audits of the electoral process, but tabulation audits are particularly important because they assess the direct evidence of voter intent for a particular election -- the voters' marks on ballots. Tabulation audits may detect errors or interference with the elections in time to correct those errors." <https://www.verifiedvoting.org/wp-content/uploads/2018/09/Checking-The-Paper-Record-Tabulation-Audit-Oversight-Guide.pdf>

3. Was a tabulation audit conducted in Cartersville with VV's assistance?
4. What is VV's expectation of being involved with the GA SOS on future projects?

I'm assuming that you have seen the continuing name calling from SOS Raffensperger, --this being the latest today in the Washington Post--where his office said that Rich DeMillo is leading an "national activist disinformation campaign." SOS has been accusing us of trying to "derail elections," claiming that we are "fringe groups," and want to violate election law, and threatening us with prosecution on fabricated allegations.

I doubt if anyone on this thread other than VV board members know the answer to these very elementary questions. The frustration you are hearing is generated by VV's lack of clarity and conflicting statements. I hope that we can use this opportunity to reach common ground that we would all want to be solid firm ground. If that is impossible, then it is better if we just quickly acknowledge that and not keep angering each other.

Thanks for considering the questions and hopefully understanding why many of us are confused. Perhaps we can wish for clarity and a united front in 2020.

Marilyn

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